

# Practice 12-1

## Example Exercises

### Example 1

Describe the pattern formed. Find the next three terms.

- |                                  |   |   |
|----------------------------------|---|---|
| 1. 5, 9, 13, 17, 21, ...         | 2. 29, 19, 9, -1, -11, ...  | 3. 9, 3, 1, $\frac{1}{3}$ , $\frac{1}{9}$ , ...                     |
| 4. 17, 15, 13, 11, 9, ...        | 5. 320, 160, 80, 40, 20, ...  | 6. 14, 15, 17, 20, 24, ...  |
| 7. 0.7, 0.5, 0.3, 0.1, -0.1, ... | 8. $\frac{1}{13}$ , $\frac{2}{13}$ , $\frac{3}{13}$ , $\frac{4}{13}$ , $\frac{5}{13}$ , ... | 9. $\frac{1}{1000}$ , $\frac{1}{100}$ , $\frac{1}{10}$ , 1, 10, ... |

### Example 2

10. You drop a ball from 8 ft above the floor. After the ball hits the floor it rebounds to 90% of its previous height.
- How high does the ball rebound after its fifth bounce?
  - Write a recursive formula for the ball's height after each bounce.
11. Suppose you have \$300 in an account paying annual interest of 4.8%, paid monthly. To calculate your interest at the end of a month, multiply your money in the bank by  $\frac{4.8}{12}\%$ , or 0.004.
- How much money would you have in the bank after the first month's interest payment?
  - Write a recursive formula for how much money you would have after each interest payment.

Write a recursive formula for each sequence. Then find the next term.

- |                             |   |  |
|-----------------------------|---|--|
| 12. -14, -8, -2, 4, 10, ... | 13. 6, 5.7, 5.4, 5.1, 4.8, ...                                      | 14. 1, -2, 4, -8, 16, ...                                  |
| 15. 1, 4, 16, 64, ...       | 16. $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \dots$ | 17. $\frac{2}{3}, 1, 1\frac{1}{3}, 1\frac{2}{3}, 2, \dots$ |
| 18. 36, 39, 42, 45, 48, ... | 19. 36, 30, 24, 18, 12, ...   | 20. 9.6, 4.8, 2.4, 1.2, 0.6, ...                           |

### Example 3

Write an explicit formula for each sequence. Then find  $a_{20}$ .

- |  |   |  |
|--|---|--|
| 21. 7, 14, 21, 28, 35, ...   | 22. 2, 8, 14, 20, 26, ...   | 23. 5, 6, 7, 8, 9, ...   |
| 24. -1, 0, 1, 2, 3, ...  | 25. 3, 5, 7, 9, 11, ...   | 26. 0.8, 1.6, 2.4, 3.2, 4, ...   |
| 27. $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1, \frac{5}{4}, \dots$ | 28. $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}, \frac{1}{10}, \dots$ | 29. $\frac{2}{3}, 1\frac{2}{3}, 2\frac{2}{3}, 3\frac{2}{3}, 4\frac{2}{3}, \dots$ |

# Practice 12-1

## Mixed Exercises

Describe the pattern formed. Find the next three terms.

1. 1, 2, 4, 8, 16, ...
2. 44, 39, 34, 29, 24, ...
3. 0.7, 0.8, 0.9, 1.0, 1.1, ...
4. 4, 11, 18, 25, 32, ...
5.  $1\frac{1}{4}$ ,  $2\frac{1}{2}$ , 5, 10, 20, ...
6. -6, -9, -12, -15, -18, ...

Decide if each formula is explicit or recursive. Then find the first five terms of each sequence.

7.  $a_n = \frac{1}{3}n$
8.  $a_n = n^2 - 6$
9.  $a_1 = 5; a_n = 3a_{n-1} - 7$
10.  $a_n = \frac{1}{2}(n - 1)$
11.  $a_1 = 5; a_n = 3 - a_{n-1}$
12.  $a_1 = -4; a_n = 2a_{n-1}$

Write an explicit or a recursive formula for the  $n$ th term. Then find the next two terms.

13. 12, 24, 36, 48, 60, ...
14.  $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \dots$
15.  $\frac{3}{49}, \frac{3}{7}, 3, 21, 147, \dots$
16. 12, 8, 4, 0, -4, ...
17.  $6, 2, \frac{2}{3}, \frac{2}{9}, \frac{2}{27}, \dots$
18. 2, 5, 10, 17, 26, ...

Write a recursive formula for each sequence. Then find the next term.

19. -200, -100, 0, 100, 200, ...
20. 256, 128, 64, 32, 16, ...
21. 20, 15, 10, 5, 0, ...
22. 1, -2, 4, -8, 16, ...
23. 60, 51, 42, 33, 24, ...
24. 0.1, 0.3, 0.9, 2.7, 8.1, ...
25.  $\frac{1}{2}, \frac{3}{4}, 1, 1\frac{1}{4}, 1\frac{1}{2}, \dots$
26. 1, 0, -1, -2, -3, ...
27.  $\frac{1}{25}, \frac{1}{5}, 1, 5, 25, \dots$

Write an explicit formula for each sequence. Then find  $a_{100}$ .

28. 7, 13, 19, 25, 31, ...
29. -4, -3, -2, -1, 0, ...
30. 0, 2, 4, 6, 8, ...
31.  $\frac{1}{3}, \frac{1}{5}, \frac{1}{7}, \frac{1}{9}, \frac{1}{11}, \dots$
32. 0.7, 1.4, 2.1, 2.8, 3.5, ...
33.  $1\frac{2}{3}, 2\frac{2}{3}, 3\frac{2}{3}, 4\frac{2}{3}, 5\frac{2}{3}, \dots$

34. The first figure of a fractal contains one segment. For each successive figure, six segments replace each segment.

- a. How many segments are in each of the first four figures of the sequence?
- b. Write a recursive formula for the sequence.

35. The sum of the measures of the exterior angles of any polygon is 360. All the angles are the same size in a regular polygon.

- a. Find the measure of one exterior angle in a regular hexagon (six angles).
- b. Write an explicit formula for the measure of one exterior angle in a regular polygon with  $n$  angles.
- c. Why would this formula not be meaningful for  $n = 1$  or 2?

# Chapter 12 Answers (continued)

3. Answers may vary. Sample: 496.5 4. Approximately 497 people visited the science museum exhibit. 5. Larger; there is area below the curve that is not included in the rectangles.  
6. Answers may vary. Sample: approximately 620 people  
7. Answers may vary. Sample: approximately 319 people

## Reteaching 12-1

1. subtract 5; 18, 13, 8 2. multiply by 2; 112, 224, 448  
3. subtract 2; -13, -15, -17  
4. multiply by 3; 162, 486, 1458 5. add 0.5; 6.5, 7, 7.5  
6. Each time the addend increases by two; 37, 47, 59 7. B  
8. E 9. A 10. F 11. C 12. D

## Reteaching 12-2

1. -28 2. 0.0129 3. -92 4. 12.2 5. 18.8 6. 118  
7. \$110 8. \$143 9. 31

## Reteaching 12-3

1.  $\frac{1}{128}$  2.  $\frac{10935}{128}$  3.  $-\frac{2}{59049}$  4.  $\frac{64}{729}$  5. 25600 6. 512  
7.  $1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}$  8. 2, 6, 18, 54, 162 9. 12, 36, 108, 324, 972  
10.  $1, \frac{1}{4}, \frac{1}{16}, \frac{1}{64}, \frac{1}{256}$  11.  $5, \frac{1}{2}, \frac{1}{20}, \frac{1}{200}, \frac{1}{2000}$   
12.  $1, \frac{1}{3}, \frac{1}{9}, \frac{1}{27}, \frac{1}{81}$

## Reteaching 12-4

1. -6 2.  $\frac{25}{36}$  3. 93 4. 22 5. -56 6. 120  
7.  $89 + (n - 1)1.5 = 87.5 + 1.5n$ ; 5490 seats

## Reteaching 12-5

1. 4095 2. 10.67 3. 5.714 4. 6.67 5. 20 6.  $-\frac{11}{13}$  7. 2  
8.  $\frac{5}{14}$  9.  $-\frac{1}{9}$  10. 100

## Reteaching 12-6

1. 0.03125 2. 3.375 3. 0 4. 2.25 5. 0.375 6. 5.375

## Practice 12-1: Example Exercises

1. add 4; 25, 29, 33 2. subtract 10; -21, -31, -41  
3. divide by 3;  $\frac{1}{27}, \frac{1}{81}, \frac{1}{243}$  4. subtract 2; 7, 5, 3  
5. divide by 2; 10, 5,  $2\frac{1}{2}$  6. each time the addend increases by one; 29, 35, 42 7. subtract 0.2; -0.3, -0.5, -0.7  
8. add  $\frac{1}{13}, \frac{6}{13}, \frac{7}{13}, \frac{8}{13}$  9. multiply by 10; 100, 1000, 10000

10a. 4.72 ft 10b.  $a_n = 0.9a_{n-1}$

11a. \$301.20 11b.  $a_n = 1.004a_{n-1}$

12.  $a_n = a_{n-1} + 6$ ; 16 13.  $a_n = a_{n-1} - 0.3$ ; 4.5

14.  $a_n = -2a_{n-1}$ ; -32 15.  $a_n = 4a_{n-1}$ ; 256

16.  $a_n = \frac{1}{2}a_{n-1}$ ;  $\frac{1}{32}$  17.  $a_n = a_{n-1} + \frac{1}{3}$ ;  $2\frac{1}{3}$

18.  $a_n = a_{n-1} + 3$ ; 51 19.  $a_n = a_{n-1} - 6$ ; 6

20.  $a_n = \frac{1}{2}a_{n-1}$ ; 0.3 21.  $a_n = 7n$ ; 140

22.  $a_n = 6n - 4$ ; 116 23.  $a_n = n + 4$ ; 24

24.  $a_n = n - 2$ ; 18 25.  $a_n = 2n + 1$ ; 41

26.  $a_n = 0.8n$ ; 16 27.  $a_n = \frac{n}{4}$ ; 5 28.  $a_n = \frac{1}{2n}$ ;  $\frac{1}{40}$

29.  $a_n = n - \frac{1}{3}$ ;  $19\frac{2}{3}$

## Practice 12-1: Mixed Exercises

1. multiply by 2; 32, 64, 128 2. subtract 5; 19, 14, 9  
3. add 0.1; 1.2, 1.3, 1.4 4. add 7; 39, 46, 53 5. multiply by 2;  
40, 80, 160 6. subtract 3; -21, -24, -27  
7. explicit;  $\frac{1}{3}, \frac{2}{3}, 1, \frac{4}{3}, \frac{5}{3}$  8. explicit; -5, -2, 3, 10, 19  
9. recursive; 5, 8, 17, 44, 125 10. explicit;  $0, \frac{1}{2}, 1, 1\frac{1}{2}, 2$   
11. recursive; 5, -2, 5, -2, 5  
12. recursive; -4, -8, -16, -32, -64  
13.  $a_1 = 12, a_n = a_{n-1} + 12$  or  $a_n = 12n$ ; 72, 84  
14.  $a_1 = 1, a_n = \frac{1}{a_{n-1} + 1}$  or  $a_n = \frac{1}{n} + \frac{1}{6}, \frac{1}{7}$   
15.  $a_1 = \frac{3}{49}, a_n = 7a_{n-1}$  or  $a_n = 3 \cdot 7^{(n-3)}$ ;  
1029, 7203 16.  $a_1 = 12, a_n = a_{n-1} - 4$  or  
 $a_n = -4n + 16$ ; -8, -12  
17.  $a_1 = 6, a_n = \frac{1}{3}a_{n-1}$  or  $a_n = \frac{2}{3^{n-2}}; \frac{2}{81}, \frac{2}{243}$   
18.  $a_n = n^2 + 1$  or  $a_1 = 2, a_n = a_{n-1} + 2n - 1$ ;  
37, 50 19.  $a_n = a_{n-1} + 100$ ; 300  
20.  $a_n = \frac{1}{2}a_{n-1}$ ; 8 21.  $a_n = a_{n-1} - 5$ ; -5  
22.  $a_n = -2a_{n-1}$ ; -32 23.  $a_n = a_{n-1} - 9$ ; 15  
24.  $a_n = 3a_{n-1}$ ; 24.3 25.  $a_n = a_{n-1} + \frac{1}{4}, 1\frac{3}{4}$   
26.  $a_n = a_{n-1} - 1$ ; -4 27.  $a_n = 5a_{n-1}$ ; 125  
28.  $a_n = 6n + 1$ ; 601 29.  $a_n = n - 5$ ; 95  
30.  $a_n = 2n - 2$ ; 198 31.  $a_n = \frac{1}{2n+1}; \frac{1}{201}$   
32.  $a_n = 0.7n$ ; 70 33.  $a_n = n + \frac{2}{3}; 100\frac{2}{3}$   
34a. 1, 6, 36, 216 34b.  $a_n = 6a_{n-1}$  35a.  $60^\circ$   
35b.  $a_n = \frac{360}{n}$  35c. No polygon has one or two angles.